

REMARKS

This Amendment responds to the Office Action dated March 8, 2004 in which the Examiner objected to claims 1 and 2 and rejected claims 1 and 2 under 35 U.S.C. § 102(b).

As indicated above, claim 1 has been amended in order to correct a minor informality. Applicant respectfully requests the Examiner approves the correction and withdraws the objection to claims 1 and 2.

As indicated above, claim 1 has been amended in order to make explicit what is implicit in the claim. The amendment is unrelated to a statutory requirement for patentability.

Claim 1 claims a wedge-operated disc brake apparatus comprising a piston, an actuator, a wedge transmission mechanism and a resilient member. The piston is accommodated within a cylinder portion to be slidable along an axial direction of the piston and adapted to push a brake pad toward a brake rotor. The actuator is for generating a linear brake-actuating input. The wedge transmission mechanism has a wedge member. The wedge transmission mechanism is connected to the actuator so as to be driven by the linear brake-actuating input which acts on the wedge member as pulling force and to convert the linear brake-actuating input into a brake-actuating output in the axial direction of the piston. The brake-actuating output is transmitted to the piston so as to cause the piston to push the brake pad toward the brake rotor. The resilient member is for axially urging the piston toward a direction away from the brake rotor.

Through the structure of the claimed invention having an actuator act on a wedge member as a pulling force, as claimed in claim 1, the claimed invention

provides a wedge-operated disc brake apparatus which enables a piston to be axially returned against a frictional engagement force, generated between a piston and a wall surface of a cylinder portion, when a breaking operation is released to thereby suppress a pad-dragging phenomenon. The prior art does not show, teach or suggest the invention as claimed in claim 1.

Claims 1 and 2 were rejected under 35 U.S.C. § 102(b) as being anticipated by *Garrett et al.* (U.S. Patent No. 4,194,596).

Garrett et al. appears to disclose a disc brake housing assembly especially suited for heavy duty track applications. (col. 1, lines 6-7) The disc brake of FIG. 1, broadly considered, includes a housing assembly 10, an air motor 12, brake pads 14 and 16, and a disc 18. Disc 18 is secured to wheel 19 of an associated vehicle, and brake pads 14, 16 are arranged to press against the opposite faces of disc 18. A push rod assembly 28 is slideably mounted in housing portion 26 for brake apply and release movement along a line of action generally parallel to the axis of wheel 19. Push rod assembly 28 includes a push rod 30 and an adjuster nut 32. When push rod 30 is moved in a brake apply direction in response to suitable actuation of air motor 12, bridge bar 36 presses inboard pad 16 against the inboard face of disc 18, whereafter housing assembly 10 slides inboard on the torque plate to press outboard pad 14 against the outboard face of disc 18 and thereby brake wheel 19, all in known manner. (col. 2, lines 30-67) Housing member 22 includes a tubular radially extending portion 48 adapted to receive a wedge actuator 50. Wedge actuator 50 is driven by the piston rod of air motor 12. Air motor 12 is secured to the free end of housing portion 48 by studs (not shown) carried by the air motor and passing through bores 48a in mounting flange 48b. (col. 3, lines 31-37) In the assembled

relation of housing members 22 and 26 and end plate 60, as best seen in FIG. 2, the inboard rollers 71 of a roller bearing assembly 72 rollably engage the inboard wedge face 52b of actuator wedge portion 52 and the outboard face 60d of end plate 60; and the outboard rollers 74 of assembly 72 rollably engage the outboard wedge face 52c of wedge portion 52 and end face 32a of adjuster nut 32. (col. 4, lines 5-12)

When wedge actuator 50 is moved in a brake apply direction by actuation of air motor 12, wedge portion 52 is wedged between adjuster nut end face 32a and end plate outboard surface 60d to move push rod assembly 28 axially outboard and apply brake pads 14, 16. (col. 4, lines 19-23)

Thus, *Garrett et al.* merely discloses moving a wedge actuator 50 by an air motor 12 to move a push rod assembly 28 axially outboard to apply brake pads 14, 16 (column 4, lines 19-23). In other words, *Garrett et al.* merely discloses pushing a wedge portion 52. However, as claimed in claim 1, a wedge member is acted on by a pulling force as claimed in claim 1. However, *Garrett et al.* teaches away from the claimed invention and provides a pushing force applied to wedge member 52.

Since nothing in *Garrett et al.* shows, teaches or suggests a wedge member acted on by a pulling force as claimed in claim 1, Applicant respectfully requests the Examiner withdraws the rejection to claim 1 under 35 U.S.C. § 102(b).

Claim 2 depends from claim 1 and recites additional features. Applicant respectfully submits that claim 2 would not have been anticipated by *Garrett et al.* within the meaning of 35 U.S.C. § 102(b) at least for the reasons as set forth above. Therefore, Applicant respectfully requests the Examiner withdraws the rejection to claim 2 under 35 U.S.C. § 102(b).

Claim 1 was rejected under 35 U.S.C. § 102(b) as being anticipated by *Deem et al.* (U.S. Patent No. 4,064,973).

Deem et al. appears to disclose a mechanical actuating and automatic adjustment mechanism for use in a heavy duty disc brake. (col. 1, lines 6-8) Referring now to the drawings, a disc brake assembly generally indicated by the numeral 10 includes a rotor 12 having a pair of opposed friction faces 14 and 16. A pair of friction elements 18, 20 are disposed adjacent each of the friction faces 14, 16 respectively and are adapted to frictionally engage the latter when a brake application is effected. (col. 2, lines 5-10) The housing 30 defines a bore 32 therewithin which slidably receives a piston 34 which is adapted to engage the friction element 18 to urge the latter into braking engagement with friction face 14. A wedge actuating mechanism generally indicated by the numeral 36 is also located within the housing 30 and includes a pair of complementary wedge elements 38, 40. The wedge element 38 is rigidly secured to the end 42 of the housing 30, and the wedge element 40 includes a body 44 which is slidably mounted in the portion 46 of the bore 32. A push rod 48 is adapted to be thrust between the wedges 38, 40 when a brake application is effected. The push rod 48 carries a roller carrier 50 which in turn mounts a pair of rollers 52, 54. (col. 2, lines 19-33) As illustrated by the dashed lines in FIG. 1, the roller carrier 50 moves with the push rod 48 until a predetermined force level is attained whereupon the push rod 48 moves relative to the rollers 52, 54 urging them a small distance additional apart. (col. 2, lines 57-61) When a brake application is effected, fluid pressure from the appropriate source is communicated through the inlet 64 into the chamber 70 where it reacts on the diaphragm 68 to move the pressure plate 66 downwardly viewing the figure. Movement of the

pressure plate 66 downwardly urges the push rod 48 downwardly so that this downward movement moves the wedge 40 to urge the friction element 18 into braking engagement with the friction face 14, and, because of the slidable connection between the caliper and the fixed support 22, reaction forces transmitted through the bridge 26 to the inwardly extending portion 28 will also urge the friction element 20 into braking engagement with the friction face 16. After the friction elements 18 and 20 are in frictional engagement with the respective friction faces, the wedge actuator push rod 48 moves relative to the rollers 52, 54 spreading them a slight small additional amount, to develop the very high braking forces necessary to effect a brake application. Movement of the wedge 40 is transmitted to the friction element 18 through the body 44, the extensible force transmitting member 84, and the piston 34 due to engagement of the head 116 with the rear face of the piston, to thereby provide a direct mechanical link between the friction element 18 and the wedge 40. Upon release of the brake, the return springs 74 and 90 urge the various components into the positions illustrated in the drawings. (col. 4, lines 11-38)

Thus, *Deem et al.* merely discloses when a brake application is affected, a push rod 48 is urged downward which causes the wedge member 40 to transmit its motion to the friction element 18. In other words, *Deem et al.* merely discloses a push rod 48 pushes a wedge 40 in order to push a friction element 18 toward a rotor 12. (col. 4, lines 11-38). However, as claimed in claim 1, the wedge member is acted on by a pulling force. However, *Deem et al.* teaches away from the claimed invention since the push rod 48 pushes the wedge member 40.

Since nothing in *Deem et al.* shows, teaches or suggests a wedge member acted on by a pulling force as claimed in claim 1, Applicant respectfully requests the Examiner withdraws the rejection to claim 1 under 35 U.S.C. § 102(b).

New claims 3-4 have been added and recite additional features. Applicants respectfully submit that these claims are in condition for allowance at least for the reasons as set forth above and since the references do not disclose an electric motor.

The prior art of record, which is not relied upon, is acknowledged. The references taken singularly or in combination do not anticipate or make obvious the claimed invention.

Thus it now appears that the application is in condition for reconsideration and allowance. Reconsideration and allowance at an early date are respectfully requested.

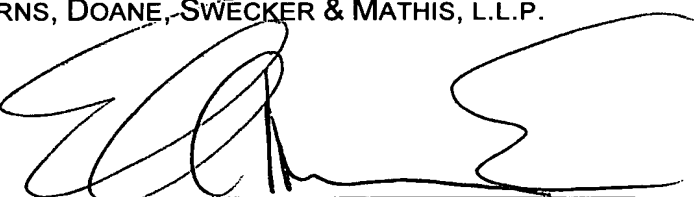
If for any reason the Examiner feels that the application is not now in condition for allowance, the Examiner is requested to contact, by telephone, the applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed within the currently set shortened statutory period, applicant respectfully petitions for an appropriate extension of time. The fees for such extension of time may be charged to our Deposit Account No. 02-4800.

In the event that any additional fees are due with this paper, please charge
our Deposit Account No. 02-4800.

Respectfully submitted,

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